

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (withdrawn): A method of manufacturing a lightweight solidifying material or changing a fluid raw material containing a water content and a solid content to a lightweight solidifying material while carrying the fluid raw material to a destination place, by using a pipe-type mixer which is provided with a mixing pipe passage, a shaft member coaxially pivoted within the mixing pipe passage, a screw vane and an agitating blade arranged in parallel in the order from an upstream side on the outer surface of the shaft member, a rotation driving means of the shaft member, and at least one additive material supplying port arranged in a corresponding position to the agitating blade in the shaft member, and which is structured such as to carry the fluid material supplied into the mixing pipe passage to the additive material supplying port via the rotated screw vane, thereafter supply an additive material to the fluid material from the additive material supplying port, and agitate and mix the fluid material and the additive material by the rotated agitating blade, comprising:

(A) a step of adjusting a gravity of the fluid raw material by adding or removing a water content;

(B) a step of continuously carrying the gravity adjusted fluid raw material via a carrier passage constituted by a pipe passage in which at least one pipe-type mixer is interposed;

(B1) a solidifying material adding step of adding and mixing a solidifying material as an additive material to the fluid raw material under the carrying step by the pipe-type mixer interposed in the middle of the carrier passage; and

(B2) a lightweight material adding step of adding and mixing a lightening material as an additive material to the fluid raw material obtained by adding the solidifying material by another pipe-type mixer interposed in a downstream side of the

pipe-type mixer in the solidifying material adding step; or supplying the lightening material from another additive material supply port of the pipe-type mixer in the solidifying material adding step and adding and mixing the lightening material to the fluid raw material obtained by adding the solidifying material.

Claim 2 (withdrawn): A method of manufacturing a lightweight solidifying material as claimed in claim 1, wherein a pressure pump is interposed in an upstream side of the pipe-type mixer adding the solidifying material in the carriage passage, and each of the additive materials is added and mixed while passing the gravity adjusted fluid raw material through the pipe-type mixer by utilizing a pressure of the pressure pump.

Claim 3 (cancelled)

Claim 4 (currently amended): A pipe-type mixer apparatus comprising:

- a mixing pipe passage having an upstream side supply portion to which a first fluid material is pressure supplied and a downstream side discharge portion from which a mixed material is discharged;

- a shaft member coaxially pivoted within the mixing pipe passage;

- a screw vane and an agitating blade arranged in parallel in the order from an upstream side on the outer surface of the shaft member;

- a rotation driving means of the shaft member; and

- a second fluid material supplying port arranged in a corresponding position to the agitating blade in the shaft member, the second fluid material supplying port being arranged in the shaft member;

wherein the pipe-type mixer is structured such as to rectify the first fluid material supplied into the mixing pipe passage by the rotated screw vane, thereafter supply ~~the~~ a second fluid material to the first fluid material from the second fluid material supplying port in the shaft member, agitate and mix the first fluid material and the second

fluid material by the rotated agitating blade, and discharge the agitated and mixed material via the discharge portion.

Claim 5 (original): A pipe-type mixer apparatus as claimed in claim 4, wherein a rectifying capacity per unit time achieved by the screw vane is equal to or more than a supply amount of the first fluid material per unit time.

Claim 6 (currently amended): A pipe-type mixer apparatus as claimed in claim 4, further comprising:

~~a mixing pipe passage having an upstream side supply portion to which a first fluid material is supplied in a non-pressurized state and a downstream side discharge portion from which a mixed material is discharged;~~

~~a shaft member coaxially pivoted within the mixing pipe passage;~~

~~a screw vane and an agitating blade arranged in parallel in the order from an upstream side on the outer surface of the shaft member;~~

~~a rotation driving means of the shaft member; and~~

~~a second fluid material supplying port arranged in a corresponding position to the agitating blade in the shaft member;~~

wherein the screw vane carries and discharges the first fluid material supplied within the mixing pipe passage on the basis of an extruding effect, and

wherein an extrusion amount per unit time achieved by the screw vane is equal to or more than a supply amount of the first fluid material per unit time.

Claim 7 (currently amended): A pipe-type mixer apparatus as claimed in claim 4, wherein a supply port of the first fluid material is arranged in the shaft member and provided in a corresponding position to the upstream side supply portion in the shaft member.

Claim 8 (cancelled)

Claim 9 (previously presented): A pipe-type mixer apparatus as claimed in claim 4, wherein the mixing pipe passage is structured such that a part or all of the downstream side of the agitating blade is positioned in an upper side of the corresponding portion to the screw vane and the agitating blade, whereby the first fluid material, the second fluid material and the mixed material are always filled at least in the downstream side portion of the screw vane.

Claim 10 (cancelled)

Claim 11 (previously presented): A pipe-type mixer apparatus as claimed in claim 4, wherein a cover member is provided in a front side of the second fluid material supplying port in the shaft member in a rotating direction of the shaft member, the cover member rotates together with the shaft member and the agitated material is pushed away, whereby a supply space for the second fluid material is formed in a second fluid material supply port position.

Claim 12 (previously presented): A pipe-type mixer apparatus as claimed in claim 4, wherein the agitating blade includes a double function blade having an agitating operation and a mixed subject carrying operation, and a single function blade having only the agitating operation, and the double function blade and the single function blade are arranged along a spiral direction around the shaft member in accordance with an alternate arrangement such that one single function blade is interposed every one or two double function blade.

Claim 13 (cancelled)

Claim 14 (previously presented): A pipe-type mixer apparatus as claimed in claim 4, wherein the screw vane is formed such that a winding number is between 1 and 3, and a pitch is 0.4 to 0.8 times of a diameter of the mixing pipe,

wherein the agitating blade is arranged in 5 to 15 pitches at an interval between 4 and 6 sheets per 1 pitch, along a spiral direction around the shaft member,

wherein a rotational speed of the shaft member is between 150 and $200/\pi d$ (rpm) at a time of driving the apparatus, in which a diameter of the screw vane and the agitating blade is set to d, and

wherein a material flow speed v within the mixing pipe passage at a time of driving the apparatus is between 10 and 50 m/min.

Claim 15 (cancelled)

Claim 16 (cancelled)

Claim 17 (cancelled)

Claim 18 (cancelled)

Claim 19 (cancelled)

Claim 20 (cancelled)

Claim 21 (new): The pipe-type mixer apparatus as claimed in claim 4, wherein the shaft member is hollow and the second fluid supplying port communicates with the hollow interior of the shaft member.

Application No. 10/768,975
Amendment Dated August 3, 2006
Reply to Office Action of March 3, 2006

Claim 22 (new): The pipe-type mixer apparatus as claimed in claim 21, wherein the second fluid supplying port is located in a position corresponding to a middle of the agitating blade.

Claim 23 (new): The pipe-type mixer apparatus as claimed in claim 22, comprising a base end opening that communicates with a supply pipe passage via a swivel apparatus.

Claim 24 (new): The pipe-type mixer apparatus as claimed in claim 23, wherein the second fluid material is supplied to a forming portion of the agitating blade from the supply pipe passage in order via the interior of the shaft member and the second material fluid supplying port.